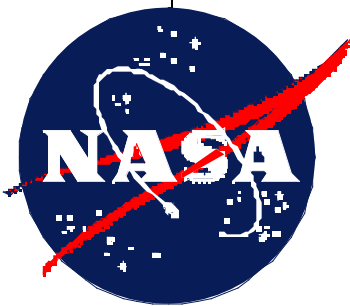


Earth Explorers Program Mission Confirmation Plan

December 2000

DRAFT



National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

**EARTH EXPLORERS PROGRAM
MISSION CONFIRMATION
PLAN**

DECEMBER 2000

**GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND**

EARTH EXPLORER PROGRAM

Mission Confirmation Plan

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Preface

A formal Confirmation Review process is required for all Earth Explorers Program missions. These missions are either directed by the Earth Science Enterprise or, solicited and selected through an Announcement of Opportunity (AO) such as Earth System Science Pathfinder (ESSP) or the University Earth System Science (UnESS). The purpose of this process is to establish that the project team has completed a credible and acceptable mission formulation subprocess and is prepared to proceed with the implementation subprocess to complete the flight and ground system development and mission operations within the identified cost and schedule constraints for the mission.

A Mission Design Review (MDR) is typically held toward the end of the definition phase of the formulation subprocess, but prior to the initiation of full-scale flight hardware/software development. The MDR Panel will be co-chaired by an independent expert (appointed by the GSFC Earth Explorers Program Office), and typically a technical co-chair from the GSFC System Review Office (SRO). The Earth Explorers Program Office and the co-chairs will select review panel members to assess the maturity of the mission, program status and ability to meet program commitments. The findings from the MDR are then presented to the GSFC Governing Program Management Council (GPMC) at a Confirmation Readiness Review (CRR) for consideration resulting in recommendations on mission confirmation. These recommendations are presented to the Associate Administrator (AA), Office of Earth Science (OES), who has final approval authority on mission confirmation. Approval of mission confirmation constitutes direction to begin the mission implementation subprocess.

1.0 Introduction

1.1 Objective

The objective of the Earth Explorers Program Office Mission Confirmation process is to provide the Earth Explorers Program Office, the GPMC and the Office of Earth Science with an independent assessment of mission readiness to proceed with the Implementation Subprocess, by identifying the technical, financial, and management risks associated with mission development and operations, and suggesting action to reduce or mitigate the risks. The products of this process will be:

A presentation of the findings of the MDR given to the Earth Explorers Program Manager, the mission Project Manager and the Principal Investigator (PI) for feedback and resolution of outstanding actions. The criteria for this review are defined in this plan.

A formal presentation of the findings of the MDR, and project responses to the findings, to the GPMC at a Confirmation Readiness Review (CRR). Based on the MDR findings and project responses the GPMC will develop recommendations on mission confirmation to be presented to the AA, OES.

1.2 Scope

The Earth Explorers Mission Confirmation process will assess the complete life cycle of the mission. Areas, which will undergo review, include, but are not limited to, system designs (hardware and software), deliverable science data products, launch vehicle interface, and mission operations, and the overall technical readiness of the mission. Management, design, manufacturing, product assurance, test plans and test facilities are also included in the scope of the assessment. In summary, the review will focus on the mission's ability to meet technical, cost and schedule commitments.

1.3 Ground Rules

- a) The Mission Design Review Panel will consist of experts from appropriate disciplines who are independent of the mission being reviewed.
- b) The Mission Design Review Panel deliberations may be conducted in closed session at the discretion of the Chairperson.
- c) The mission requirements are defined in the Mission Level 1 Requirements Document. The panel will assess the mission based on the ability to deliver the science data as defined in the above document.

2.0 Mission Design Review

2.1 Mission Design Review Organization

The MDR panel is led by the Co-Chairs, who will coordinate with the Project/Mission Manager to ensure that the team has access to sufficient information to accomplish its objectives with a minimum impact to the mission. They will coordinate the review panel activities and present the findings. The team members are selected by the Co-Chairs and are approved by the Earth Explorers Program Office.

2.2 Review Process

The Mission Design Review typically will be held over a 2-3 day period at GSFC or a suitable mission team site. The panel will meet at the conclusion of each day to discuss the results of the day's presentations and develop the preliminary findings and recommendations. At these sessions, panel members should be prepared to brief the MDR Co-Chairs on their findings for their assigned area. The individual briefings will then be integrated into comprehensive findings of the panel. At the conclusion of the review, each member will provide the Co-Chairs with a summary of their findings, as well as any specific action items or recommendations they have identified. The Co-Chairs will brief the Principal Investigator, Project/Mission Manager and the Earth Explorers Program Manager on the review panel findings at this time. The PI, project manager and their mission team will develop responses to the panel findings, which will be coordinated with the MDR Co-Chairs. The Principal Investigator, Project/Mission Manager, the MDR Co-Chairs and the Earth Explorers Program Office will then present the findings, recommendations and responses to the Goddard Program Management Council at the CRR for recommendations for proceeding into the mission implementation subprocess. The GPMC will present their recommendation to the Office of Earth Science Associate Administrator for approval. In order to minimize the impact on the mission schedule, the entire confirmation process should be completed within two months.

2.3 Nominal Schedule

Mission Design Review	Duration of 2-3 days
Panel members' report due to Chairperson	At conclusion of MDR
Panel brief to PI/Project/Earth Explorers	At conclusion of MDR
PI/Project Team Response	Within 3 weeks after MDR
GPMC Confirmation Readiness Review	Within 4 weeks after MDR
OES Mission Confirmation Review	Within 2 weeks after CRR

3.0 Success Criteria

3.1 Science and Technical Evaluation

1. Does the Mission, Spacecraft and Instrument Design, as presented, reflect a level of maturity that meets the mission science requirements?

Scope of Criteria 1 - Indicator questions

What are the mission science requirements? How have requirements been allocated to each mission element, e.g. spacecraft, instrument, and ground system? What is the status of requirement allocations to subsystems of each element?

What is the status of the hardware being developed for the mission? What has affected the hardware development since mission selection? What critical activities (design, tests, etc.) remain to assure the hardware can be included in the mission?

What are the technical metrics used by the project? What is the status and trend of each?

What are the results of analyses, tests and design activities related to the hardware developments?

What system trades have been completed? What are the remaining trade studies that must be completed?

What is the specific design and/or flight heritage of the spacecraft systems and instruments?

What is the status of the primary interfaces, e.g., instrument to spacecraft, spacecraft to LV, and spacecraft to ground? What design, test, and integration tasks are allocated to NASA, or other government agencies?

What is the status of the software development? How has software been estimated for each element and subsystem? How have margins been allocated to accommodate any technologies affecting the software?

What validation/calibration is needed/planned prior to launch to ensure science objectives are met? What is the science validation plan during operations? What critical data is needed during operations and how is the data to be captured?

What is the descope plan and what are the milestones for descope? What are potential mass, power, and software impacts for each descope option? Has the project quantified the potential?

What are the cost and schedule impacts/improvements for each descope option? What is the impact of each descope option on the mission science deliverables?

What is the test and integration plan for the project?

What is the mission operations concept?

What is the ground system architecture?

3.2 Management Structure and Composition Evaluation

2. Are the Management Processes used by the Mission Team sufficient to develop and operate the Mission?

Scope of Criteria 2 - Indicator questions

What is the systems engineering management approach?

Are the roles and responsibilities of each organization clearly defined? What is the experience of key project personnel in each organization? What processes are in place for making, communicating and implementing project decisions? What project management system, in place or planned, is used to track the status of each task and its deliverables?

Is there a common cost/schedule reporting system being utilized across the project?

What is the risk identification and mitigation process? What risks have been identified? What are the mitigation plans?

What is the process for managing and implementing mission descopes? Who has approval authority for implementing descopes?

What is the critical path and how is it being routinely assessed and managed?

Is the WBS complete with all deliverables defined? Is there an intersite delivery plan or matrix?

What is the plan for manufacturing the spacecraft and instruments? What are the critical long lead parts or material? What is the long lead procurement status? Have all required facilities been identified and utilization planning developed? Are agreements in place for use of facilities for testing? What is the schedule flexibility?

What oversight/insight is being exercised by GSFC on all elements? How and to what tasks have civil servant resources been allocated to supplement developments?

What process changes are being made to minimize the development time and cost (smaller, faster, cheaper)?

3.3 Cost and Schedule Evaluation

3. Do the cost estimates, control processes and schedules indicate the mission will be ready to launch on time and within budget?

Scope of Criteria 3 - Indicator questions

What is included in the project budget and what is covered elsewhere?

For items covered outside the project budget, is there sufficient funding planned? Could the project cover shortfalls for these items with project budget?

How does the current cost estimate and burn-rate compare to the baseline? Does the cost analysis indicate the mission will stay within the project budget?

What cost and schedule monitoring and control processes are in place? How is progress being measured? How are reserves allocated and released? Is there sufficient reserve in cost and schedule to complete the mission by the planned launch date?

What incentives are in place to control cost and schedule? How are the program cost caps reflected in contracts and allocated?

Earth Explorers IAR Acronym List

AA	Associate Administrator
ABS	A Band Spectrometer
AO	Announcement of Opportunity
CCB	Center Control Board
CCOSM	Chemistry and Circulation Occultation Spectroscopy Mission
CDR	Critical Design Review
CFO	Chief Financial Officer
CIC	Capital Investment Council
CIRRUS	Cloud InfraRed Radiometer for UnESS
CM	Configuration Management
COTR	Contracting Officer's Technical Representative
CPM	Critical Path Method
CSA	Canadian Space Agency
CSU	Colorado State University
CTC	Cost to Complete
DOE	Department of Energy
DPAF	Duel Payload Attachment Fitting
EE	Earth Explorers
EEP	Earth Explorers Program
EIK	Extended Interaction Klystron
EOS-G	Earth Observatory System-GSFC
ESE	Earth Science Enterprise
ESMO	Earth Science Mission Operations
ESSP	Earth System Science Pathfinder
ETC	Estimate to Complete
FBC	Faster Better Cheaper
FMEA	Failure Modes and Effects Analysis
FRR	Flight Readiness Review
FTA	Fault Tree Analysis
FY	Fiscal Year
GPMC	Goddard Program Management Council
GRACE	Gravity Recovery and Climate Experiment
GSE	Government Sustained Equipment
GSFC	Goddard Space Flight Center
H/W	Hardware
HQ	Headquarters
HU	Hampton University
I&T	Integration and Test
IAR	Independent Annual Review
IFM	Integrated Financial Management
IIR	Imaging Infrared Radiometer
IPSL	Institute Pierre Simon Laplace

Earth Explorers IAR Acronym List - Continued

IV&V	Independent Verification and Validation
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSC	Kennedy Space Center
L/V	Launch Vehicle
LaRC	Langley Research Center
LRR	Launch Readiness Review
MBLA	Multi-Beam Laser Altimeter
MBM	Mission Business Manager
MCR	Mission Confirmation Review
MCRR	Mission Confirmation Readiness Review
MDR	Mission Design Review
MDRA	Mission Definition and Requirements Agreement
MM	Mission Manager
MOCD	Mission Operations Concept Document
MOU	Memorandum of Understanding
MRR	Mission Readiness Review
MSR	Monthly Status Review
NEPA	National Environmental Program Assessments
NET	No Earlier Than
NHB	NASA Hand Book
NMC	NASA Mission Cost
NOA	New Obligational Authority
NPG	NASA Procedures and Guidelines
OMB	Office of Management and Budget
ORR	Operational Readiness Review
PABSI	Profiling A Band Spectrometer and Imager
PCA	Program Commitment Agreement
PDR	Preliminary Design Review
PER	Pre-Environmental Review
PI	Principal Investigator
PICASSO	Pathfinder Instruments for Cloud and Aerosol Spaceborne Observations
PM	Program Manager
PMC	Program Management Council
POP	Program Operating Plan
PRA	Probabilistic Risk Assessment
PSM	Project Support Manager
PSR	Pre-Ship Review

PSS	Project Support Specialist
RA	Resource Analyst
RAO	Resource Analysis Office
RFES	Radio Frequency Electronics Subsystem

Earth Explorers IAR Acronym List - Continued

RFP	Release for Proposal
RTG	Radioisotope Thermoelectric Generators
S/C	Spacecraft
SAC-C	Scientific Application Satellite-C
SDB	Small and Disadvantage Business
SLA	Shuttle Laser Altimeter
SMRD	Science and Mission Requirements Document
SOW	Statement of Work
SRR	System Requirements Review
STS	Space Transportation System
TMC	Total Mission Cost
TRL	Technology Readiness Levels
UMCP	University of Maryland College Park
UnESS	University-class Earth System Science
USAF	United States Air Force
UTCSR	University of Texas Center for Space Research
VAFB	Vandenberg Air Force Base
VCL	Vegetation Canopy Lidar
WBS	Work Breakdown Structure
WFF	Wallops Flight Facility